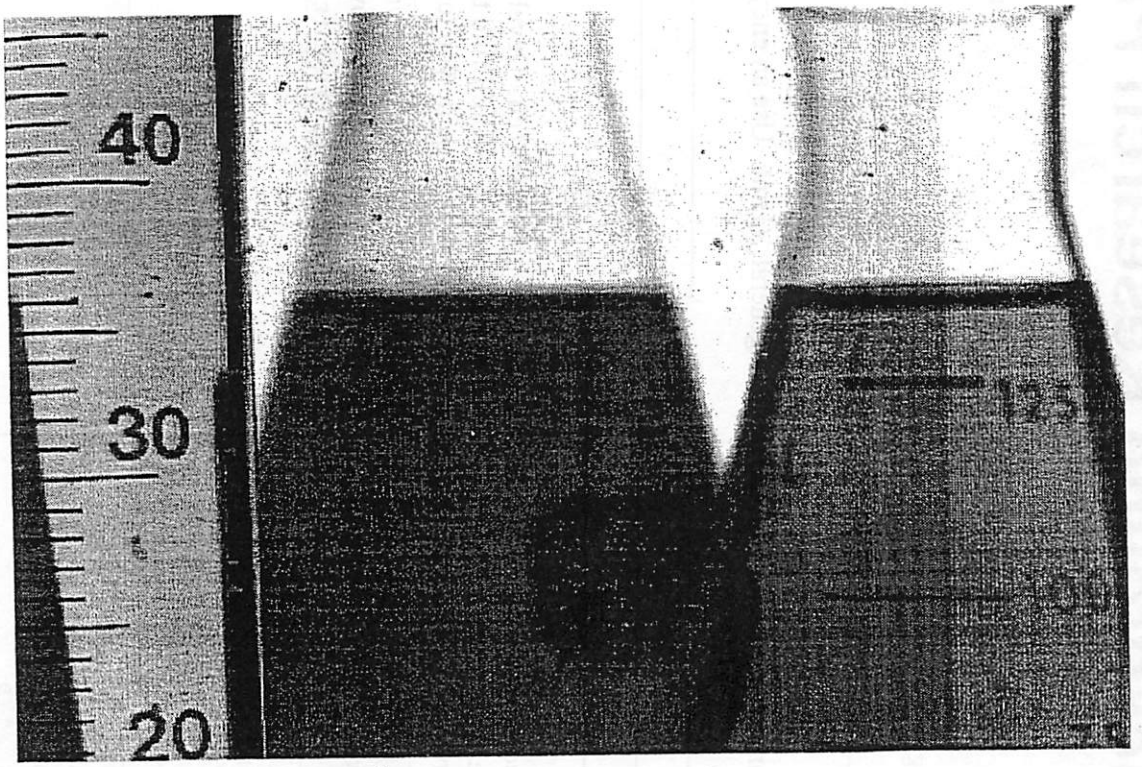
Salem High School Science Fair 2014



Name: _____

Grade : _____ Hour: _____

Background Research Plan Worksheet

Name: _____

1. What is the **question** you are going try to answer with an experiment? _____

_____

2. List the **keywords** and phrases from your question and the topic in general. (Hint: Use an encyclopedia to help you)

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

3. Now use your keywords to build some **questions to guide your background research.** Develop at least two or three from each "question word." Don't worry about whether you already know the answer to the question—you'll find the answers when you do your background research. And don't forget to "network" with knowledgeable adults who can help guide you toward good materials!

Question Word	Possible Questions (you can think of others)	Substitute your keywords (or variations of your keywords) for the blanks in the previous column. Write down the relevant questions and use them to guide your background research.
Why	Why does ____ happen? Why does ____ ____? Why _____?	
How	How does ____happen? How does ____ work? How does ____ detect ____? How does one measure ____? How do we use _____? How _____?	

Question Word	Possible Questions (you can think of others)	Substitute your keywords (or variations of your keywords) for the blanks in the previous column. Write down the relevant questions and use them to guide your background research.
Who	Who needs _____? Who discovered _____? Who invented _____? Who _____?	
What	What causes _____ to increase/decrease? What is _____ made of? What are the characteristics of ____? What is the relationship between ____ and ____? What do we use _____ for? What _____?	
When	When does _____ cause _____? When was _____ discovered? When _____?	
Where	Where does _____ occur? Where does _____ get used? Where _____?	

4. To analyze the results from experiments you might need to know some **key formulas or equations**. Think about your own experiment and write down any step or task that requires a formula or equation. Don't worry about whether you already know what the formula or equation is—you'll find the actual equation when you do your background research.

   List steps or tasks that may require a formula or equation:

_____ _____ _____ _____

_____ _____ _____ _____

Science Fair Conference Form

Name: _____ Science Teacher _____

Name of science fair partner (if applicable):

Name: _____ Science Teacher _____

Fill out this form completely, neatly, and with great detail.

My general category area is (See "Rules and Regulations" on page _____ ex: Chemistry):

_____

_____

I will test to solve a problem by conducting a controlled experiment that answers the following cause and effect question (ex: What effect does the level of humidity have on the amount of static electricity that can be generated?):

_____

_____

_____

My hypothesis/educated guess for my science fair project is the following (Please answer the question you asked above):

_____

_____

_____

_____

The purpose of solving this problem as my science fair topic is (You must have a meaningful purpose for your project):

_____

_____

_____

_____

State briefly and clearly what your general plan is for conducting your controlled experiment:

_____

_____

_____

_____

_____

_____

I will control the following variables in my experiment (dependent variable):

_____

_____

_____

The one variable that I want to test will be (independent variable):

_____

_____

In order to have my data collected and be ready to finish my project upon March 1st. . .

I will start my experiment by: _____
Date

I will have my experiment completed by: _____
Date

How to write the bibliography:

Your first assignment is to gather at least 5 sources for your bibliography while you are doing your research. One of these sources must be a book. The others can be online sources, science related articles from magazines or newspapers, encyclopedia, audiovisual materials, CD-ROM or even an interview of a professional person. If you are working with or interviewing an expert in the field of study that corresponds with your topic, that person can be used as a resource.

How to Cite Your Sources...

A GUIDE TO PREPARING A BIBLIOGRAPHY

When doing research and writing a report, it is always necessary to name the source(s) of your information.

Your bibliography must be on a separate sheet of paper from the rest of your paper.

The word "Bibliography" must be centered at the top on the page.

There must be 5 (or more) sources listed.

Entries on a bibliography page must be listed alphabetically.

The second line of an entry should be indented.

Skip a line after each entry.

FOR A BOOK:

Author's last name, first name. Title of book. Place of publication: Publisher, copyright year.

example:

Fogle, Bruce. Training Your Dog. New York: DK Publishing, 2001.

If you only used part of a book:

Fogle, Bruce. Training Your Dog. New York: DK Publishing, 2001, pp. 50-55.

FOR AN ENCYCLOPEDIA ARTICLE THAT IS SIGNED:

Article author's last name, first name. "Title of article." Name of encyclopedia. Copyright year. Volume number, page(s).

example:

Clark, William W. "Gothic Art." World Book Encyclopedia. 2002.
Volume 8, pp. 277-278.

FOR AN ENCYCLOPEDIA ARTICLE THAT ISN'T SIGNED:

"Title of article." Name of encyclopedia. Copyright year. Volume number, page(s).

example:

"Golden Retriever." World Book Encyclopedia. 1999. Volume 8, p.255.

FOR A MAGAZINE OR NEWSPAPER ARTICLE:

Article author's last name, first name. "Title or headline of article." Name of magazine or newspaper. Date of magazine or newspaper, page(s).

example:

McGill, Kristy. "A Baltic Scramble." Faces. May, 2003, p. 27.

FOR AN INTERNET ADDRESS:
Author's last name, first name. "Title of item." [Online] Available http://address/filename, date of document or download.

example:

DiStefano, Vince. "Guidelines for Better Writing." [Online] Available http://www.usa.net/~vinced/home/better-writing.html, October 5, 2002.

This example of how to cite an INTERNET source was downloaded from this online source.

FOR AUDIOVISUAL MATERIALS:
Title of material. Type of material. Place of publication: Publisher, copyright date.

example:

Bizet's Dream. Videotape. New York: Sony Wonder, 1998.

FOR A CD-ROM:
"Article title." CD-ROM title. CD-ROM. Copyright date.

example:

"Titanic Disaster." Encarta 99 Encyclopedia. CD-ROM. 1999.

FOR AN INTERVIEW:
Name of person interviewed (last name first). Kind of interview. Date.

example:

Watson, Cosmo. Personal interview. July 29, 2003.

Your finished Works Cited should be alphabetized by the first word of the entry, and will look something like this:

BIBLIGROPHY

Bizet's Dream. Videotape. New York: Sony Wonder, 1998.

Clark, William W. "Gothic Art." World Book Encyclopedia. 2002.
Volume 8, pp. 284-286.

DiStefano, Vince. "Guidelines for Better Writing." [Online] Available
http://www.usa.net/~vinced/home/better-writing.html, October 5, 2002.

Fogle, Bruce. Training Your Dog. New York: DK Publishing, 2001, pp. 50-55.

"Golden Retriever." World Book Encyclopedia. 1999. Volume 8, p.255.

McGill, Kristy. "A Baltic Scramble." Faces. May, 2003, p. 27.

"Titanic Disaster." Encarta 99 Encyclopedia. CD-ROM. 1999.

Watson, Cosmo. Personal interview. July 29, 2003.

How to write the "Problem" & "Hypothesis":

Problem:

For the problem, you are to specifically define the problem you are trying to solve. The problem should be written as a question and punctuated with a question mark.

(For example: Advertisers are always touting more powerful and longer lasting batteries, but which batteries really do last the longest?)

The problem states what question you have about your experiment. This will lead you to your hypothesis...

Hypothesis:

After having thoroughly researched your question, you should have some educated guess about how things work. This educated guess about the answer to your question is called the hypothesis.

The hypothesis must be worded so that it can be tested in your experiment. Do this by expressing the hypothesis using your independent variable (the variable you change during your experiment) and your dependent variable (the variable you observe-changes in the dependent variable depend on changes in the independent variable). In fact, many hypotheses are stated exactly like this: "If a particular independent variable is changed, then there is also a change in a certain dependent variable."

Example Hypotheses:

- "I think if I open the faucet [faucet opening size is the independent variable], then it will increase the flow of water [flow of water is the dependent variable].
- "I believe raising the temperature of a cup of water [temperature is the independent variable] will increase the amount of sugar that dissolves [the amount of sugar is the dependent variable]."
- "I think if a plant receives fertilizer [having fertilizer is the independent variable], then it will grow to be bigger than a plant that does not receive fertilizer [plant size is the dependent variable]."
- "I believe if I put fenders on a bicycle [having fenders is the independent variable], then they will keep the rider dry when riding through puddles [the dependent variable is how much water splashes on the rider]."

Note: When you write your own hypothesis you can leave out the part in the above examples that is in brackets [ ].

Notice that in each of the examples it will be easy to measure the independent variables. This is another important characteristic of a good hypothesis. If we can readily measure the variables in the hypothesis, then we say that the hypothesis is **testable**.

Most of the time a hypothesis is written like this: "I believe if _____[I do this]_____, then _____[this]_____ will happen." (Fill in the blanks with the appropriate information from your own experiment.)

How to write the "Purpose" portion:

The purpose statement will tell the reader why you want to do this experiment. What are you trying to solve or prove? Below you will find some questions to fill in to help you come up with a good purpose statement.

Fill in the blanks to create a quality purpose statement.

The purpose of this experiment is to _____
_____
I became interested in this experiment when _____
_____
The information gained from this experiment will help others by
_____
_____
_____
_____

How to write the "Materials" portion:

Put together a list of all the materials that you will need for the "testing" aspect of your science fair project. You need to be very specific.

If you are testing a population of people then you need to include a description of those people. If you are testing 50 – 7th grade students you must say just that. Please don't just writing, "50 people".

If you use materials you must include measurements. Please don't just write, "Water," write "100mL of room temperature water". Use quantitative measurements with proper scientific

units [ex. weight (g, mg, Kg, etc.), volume (mL, L, KL, etc.), length (mm, m, Km, etc.)]

You must include everything you use even including pen and paper.

Think as though some scientist in another part of the world is going to go gather all the supplies from your materials list and repeat your experiment exactly. Once that scientist starts he/she shouldn't ever have to make another run to the store to pick up something you forgot to add to your list.

This part of your paper must have the title "Materials", underlined on the left margin of your paper. Beneath this heading, you will list all the materials with normal bullets (Dot). Also, it must be typed in normal font (Arial or Times New Roman), normal margins (1 inch), normal font size (11 or 12), and black ink only.
Example:

Materials:

- 60 pencils
- 60 students, age12-13
- 60 pieces of paper
- 1 digital timer
- 60 Puzzles, selected by tester
- 2 quiet rooms
- 1 desk for each student
- 60 pieces of candy (Jolly Ranchers)

How to write the "Procedure" portion:

You must write a list of every step you took to complete your experiment/test. These steps need to be numbered in the order that you did them. You need to be very specific when describing each step but you don't have to worry about writing your procedures in complete sentences. Your procedure section of your paper should be so exact that someone could take this part of your paper and repeat your experiment/procedure exactly as you performed it.

This part of your paper must have the title "Procedure", underlined on the left margin of your paper. Beneath this heading, you will list and number all the steps to your procedure. Also, it must be typed in normal font (Arial or Times New Roman), normal margins (1 inch), normal font size (11 or 12), and black ink only.
Example...

Procedure:

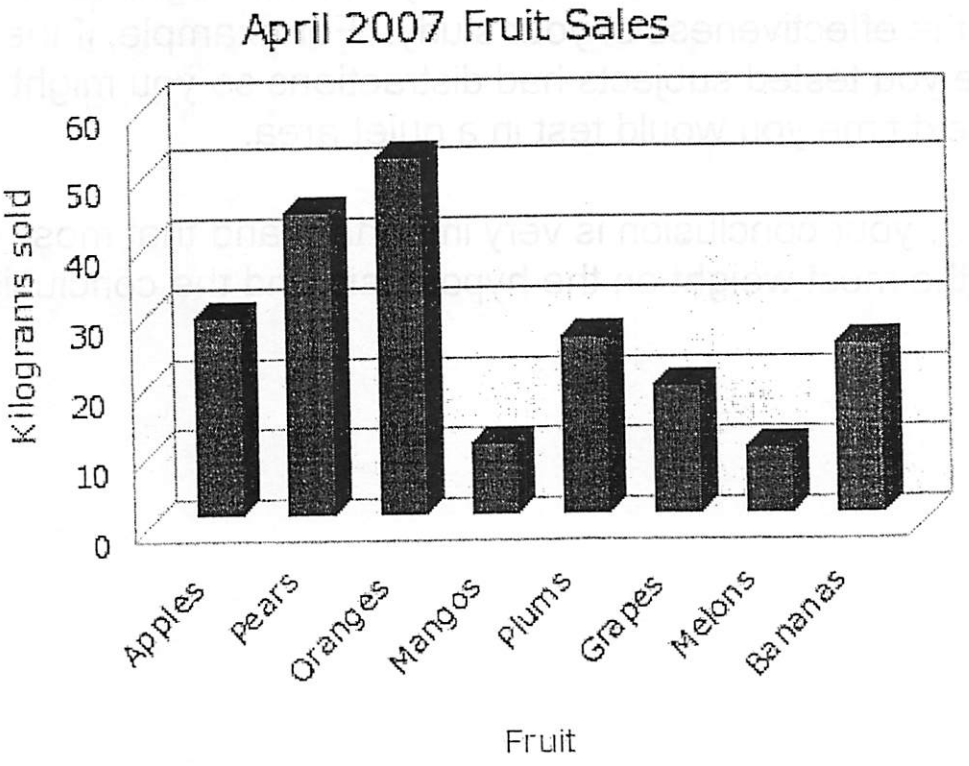
1. Take out 15 – 50mL test tubes
2. With a wax pencil, mark each test tube with the concentration of sugar solution that will go in it from 5 mg/mL to 45 mg/mL
3. Using a graduated cylinder, measure out 50 mL of distilled water into each test tube
4. Measure out 5 grams of sugar for the first test tube and increase the amount of sugar by 5g for every consecutive test tube up to 45g
5. Etc...

Continue this way and be sure to include how you are going to collect your data.

How to write the "Results" portion:

The results of your paper will be the documentation of all the results you gathered as a result of your experiment. These results should be in the form of tables and graphs. Generate all your tables and graphs on your computer. These graphs must be done correctly and be colorful. Mr. Gawecki will teach you how to graph properly (Title, X&Y axis labeled, units included, etc.). Make sure your title shows the Judges/onlookers what information you are trying to provide in your table/graph.

You are required to have one graph/table at a minimum. Mr. Gawecki expects more. The more information you have the more informative project will be.



How to write the "Conclusion" portion:

In order to write a great conclusion to your paper, you must spend some time analyzing the success of your project. This is the most important step to your project next to the hypothesis. In fact, your conclusion should relate back to your hypothesis. You should start it out by saying if your hypothesis was correct or not and why. If it was correct state what additional testing you might like to do to further your investigation. If it was wrong explain why or where your experiment went wrong. In both cases you need to analyze how well you think your experiment went. Even if everything was successful you should explain how it could have been better.

Include factors in your test situation that you think might have decreased the effectiveness of your study. For example, if the room where you tested subjects had distractions so you might state that next time you would test in a quiet area.

Remember... your conclusion is very important and that most judges put the most weight on the hypothesis and the conclusion.

Abstract:

The abstract should contain one or two paragraphs (>250 words) which clearly and concisely present an overview of the report. Complete sentences must be used, not phrases. Nine out of ten readers will read only the abstract of an science fair report - therefore, it is imperative that clear, concise, and to-the-point information be used. Include information on

- What was done
- Key results
- Key conclusions

Extra Photographs:

- Please take lots and lots of photographs all the way through your experiment. It's true... A picture is worth 1000 words. Add your favorites to your display board but if you have taken more good ones, please put them in this section of your binder.

COMPLETING THE ABSTRACT:

Abstracts are limited to a maximum 250 words and must fit within the predefined area. Please be sure to consult the information from your affiliate fair for the proper formatting of the header information as fairs differ in what is required (or not allowed).

The abstract **should include the following:**

a) *purpose of the experiment*
b) *procedure*
c) *data*
d) *conclusions*

It may also include any possible research applications. Only minimal reference to previous work may be included. An abstract **must not include the following:**

a) *acknowledgments (including naming the research institution and/or mentor with which you were working), or self-promotions and external endorsements*
b) *work or procedures done by the mentor*

COMPLETING THE CERTIFICATION:

At the bottom of the Abstract & Certification form there are six questions. Read each carefully and answer appropriately. The Affiliated Fair Scientific Research Committee will review and approve the abstract and answers to the questions.

Please bring a copy of your Abstract & Certification to the fair and be sure to consult with your affiliated fair regarding the rules of making copies to distribute.

TIPS ON WRITING A PROJECT ABSTRACT

A project abstract is a brief paragraph or two (limited to 250 words or 1,800 characters) highlighting and/or summarizing the major points or most important ideas about your project. An abstract allows judges to quickly determine the nature and scope of a project.

- Emphasize these aspects: purpose (hypothesis), methods (procedures used), data summary or analysis, and conclusions.
- Focus only on the current year's research.
- Omit details and discussions.
- Use the past tense when describing what was done. However, where appropriate use active verbs rather than passive verbs.
- Use short sentences, but vary sentence structure.
- Use complete sentences. Don't abbreviate by omitting articles or other small words in order to save space.
- Avoid jargon and use appropriate scientific language.
- Use concise syntax, correct spelling, grammar, and punctuation.

AVOID A REWRITE

- Focus on what you did, not on the work of your mentor or of the laboratory in which you did your work.
- Do NOT include acknowledgements, self promotion or external endorsements. Don't name the research institution and/or mentor with which you were working and avoid mentioning awards or honors (including achieving a patent) in the body of the abstract.
- Be sure to emphasize the current year's research. A continuation project should only make a brief mention of previous years' research (no more than a sentence or two).